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BIOMASS
POWER & THERMAL

Powerful Waste

How Missouri Can Optimize Its Biogas Resources

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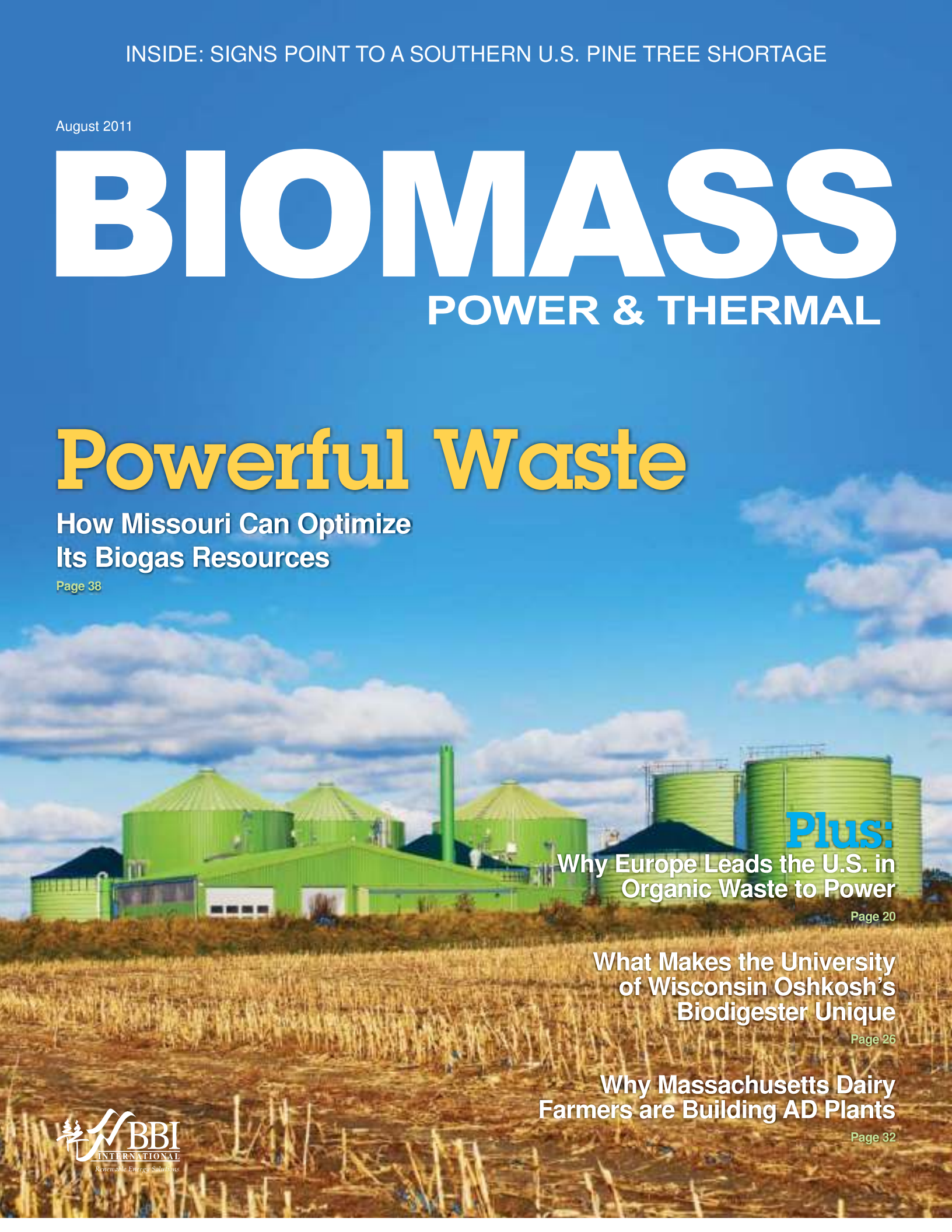

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BBI INTERNATIONAL
Renewable Energy Solutions

COW POWER: Hampton Feedlot will host Missouri's first on-farm, electricity-generating anaerobic digester.

PHOTO: HAMPTON FEEDLOT

Methanation in Missouri

Missouri has ample resources for a booming anaerobic digestion sector, but surprisingly few parties have taken advantage of the enormous opportunity.

BY LISA GIBSON

Hampton Feedlot Inc. in north central Missouri's Chariton County is developing the state's first electricity-generating, on-farm anaerobic digester. Surprising, considering Missouri is among the top five hog-producing states in the country, and has a typical cattle farm head count of around 5,000.

Its roughly 200 hog operations alone are capable of producing 2.7 billion cubic feet of methane to generate 177,000 megawatt hours of electricity each year. "There's ample ground [for energy production]," says Christopher Chung, CEO of the Missouri Partnership, an organization devoted to promoting the state for business investment in certain targeted sectors, including energy solutions.

Over the past year, the Missouri Partnership has focused a closer and more serious eye on biomass, biofuels and biogas opportunities in the state, biogas being the most recent. "We've started looking at ways to position Missouri's wealth of assets to attract companies that generate energy using those systems," Chung says. "We know we've got hog farms. We know we are generating a lot of animal waste that can be successfully converted to energy, but who is it we need to reach out to? Where are the primary targets? Who is in a position where they are expanding biogas-to-energy generation facilities, and can we get in front of them to talk about Missouri?"

But finding business investors and equipment manufacturers is only half the battle. Chung adds that educating farmers about the opportunities under their feet is a vital piece of the puzzle. "I think it was a while before farmers realized the potential for renewable energy generation through wind, for example, and realized they could be leasing out areas for wind turbines," he says. "And I'm sure the same learning curve exists for lots of other applications for renewable energy, including biogas."

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—**Christopher Chung**, CEO, Missouri Partnership

Biogas Grants

The Missouri Department of Natural Resources is navigating that curve with its biogas program, and hasn't stopped there. The agency provided development funding through its Energize Missouri Renewable Energy Biogas Grants and awarded almost $500,000 each to two biogas projects. They were chosen in 2010 through an expert review process and will receive reimbursement payments from the department upon their completion and successful demonstration. The grant funds were dedicated to support agricultural or industrial projects that use anaerobic digestion-to-energy and landfill biogas-to-energy systems. Eligible projects in the running for the $2.25 million in American Recovery and Reinvestment Act funds allocated to the grant opportunity included those that produce biopower, bioheat or other forms of bioenergy.

Eight in-depth applications were submitted for the competitive grants and five were chosen, according Ming Xu, Missouri DNR biogas program manager and energy specialist for the state DNR's Division of Energy. Among the eight applicants considered were five landfill operations, one industrial wastewater project and just two on-farm digester projects. Although five were chosen, a project completion deadline of March 2012 weeded out three, leaving a farm digester and a landfill gas project the sole awardees. While at least one of the other projects—a $13 million digester on Johnson County Egg Farm—will still be developed with the help of the DNR, any progress made will be achieved sans a biogas program grant.

Xu doesn't mask his enthusiasm when describing the remaining grant recipients. "After they signed the agreement with us, they worked very diligently on their projects," he says. Investor-owned utility Kansas City Power & Light Greater Missouri Operations Co. is in the process of installing a $6 million, 1.6 MW landfill gas-to-electricity plant in the St. Joseph city landfill in Buchanan County, northwest Missouri. The resulting power will be distributed to the utility's existing customers. The landfill gas collection and control system expansion aspects of the project are nearing completion, Xu says, and the genset is slated for installation this month. Just like its fellow grant recipient, Hampton Feedlot, the landfill project will receive $450,000 and is on track for completion in October or November.

Although small, the Hampton Feedlot anaerobic digester does have the unique classification as the first farm digester-to-electricity project in the state of Missouri, even though it is not a typical farm, but a custom feedlot permitted for 5,200 head of cattle. Its 300 kilowatts will be used on-site, with the possibility of any excess sold to the grid, according to Terry Smith, independent consultant for the feedlot. "DNR has been very good about helping us with this," she says. "They have an interest in seeing us accomplish what we're doing."

The $4 million project's Induced Blanket Reactor digester, developed by equipment provider Andigen, is designed to create a rich concentration of digesting bacteria inside the tanks. The influent en-

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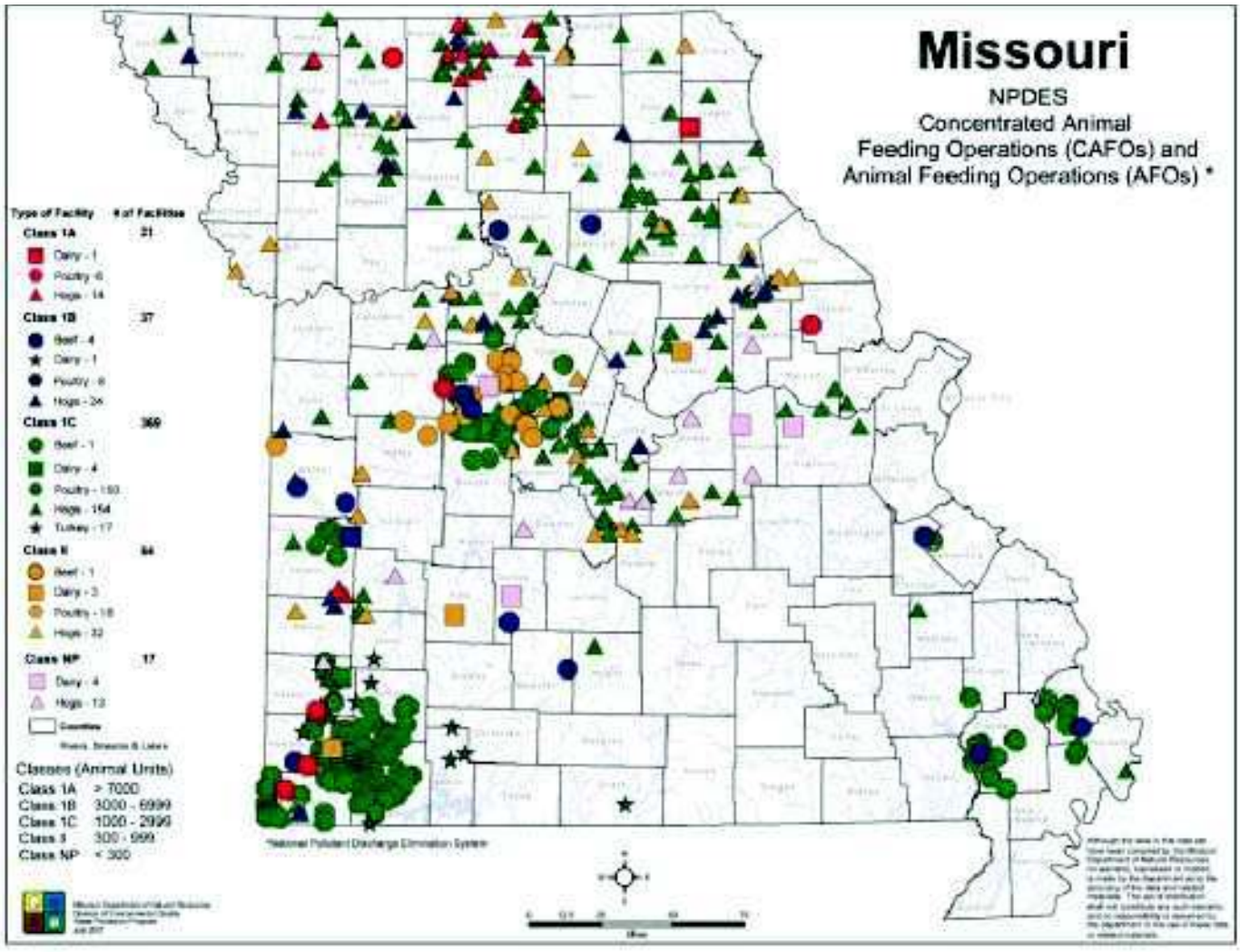

SOURCE: MISSOURI DNR

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PHOTO: HAMPTON FEEDLOT

TOWERING TANKS: Six giant tanks at Hampton Feedlot will digest the manure from 2,400 cattle.

ters the lower part of the tank and gradually moves upward through the rich bacteria blanket where digestion and gas production occurs, according to Andigen. The size of the system is based on the amount of manure that will be used, Smith says, and Hampton will use six tanks. The giant white digester tanks have been set and construction of the surrounding structure is currently underway. The feedlot will collect about 52 pounds of manure and urine per head annually from the 2,400 cattle, narrowing collection exclusively to animals in feeding stalls with concrete slats. "Right now, there's no way for us to capture the manure coming off the dirt lot," Smith says.

The concrete floors will be scraped daily with a Bobcat and pumped to the digesters, according to Jimmy Daniels, secretary/treasurer for the feedlot. Currently, he adds, that waste is disposed of into a lagoon equipped with four irrigators. Expansion is most likely in the future for the 20-year project, pending its anticipated success. "We are a group of out-of-the-box thinkers and plan on moving in new directions," he says.

Those new directions include an assessment of the added use of substrates in the process. "Right now, we're just evaluating our demand and trying to structure the use so we can sell as much electricity as possible," Smith says. With the addition of substrates to the digester's feedstock, the plant could double its output. "The building will be ready for another genset whenever we decide to [install one]," Daniels adds. "We just have to slide one in."

The family-owned feedlot began exploring similar renewable energy ideas about four years ago, initially focusing on ethanol

production. Plans started and stopped, volleyed up and down, but Daniels and Smith agree that the DNR biogas grant program was a pivotal development in the project's potential. "The grants definitely made it more feasible," Smith says. The project also received a grant and loan guarantee from the USDA, as well as tax credits from other agencies for current and future project plans, including a possible composting component. A grateful Smith made sure to acknowledge the partnership between Hampton and small-business assisting nonprofit Missouri Enterprise during work on the multiple-page application for the DNR grant. "We submitted a lot of information," she says.

Now that the deal is sealed, the project is finally a reality and fits in perfectly with the company's goals. "We feel like the 'green' will come back and we wanted to be out in front and try to do what we could do," Daniels says.

Setting an Example

Hampton Feedlot is indeed out in front, but could be joined in the near future if interest in anaerobic digestion picks up. Chung says plenty of incentives are in place that could spur development in the agricultural state. Like most states, Missouri tends to look at capital investment, and more importantly job creation, to advance its standing in a variety of sectors. With a countrywide emphasis on renewable energy, anaerobic digestion applications should be in a prime position to take advantage of that. "As long as you're creating jobs and typically, as long as you're making some kind of significant capital investment somewhere in Missouri, you're likely to be eligible for things like tax credits," Chung says.

It's important to provide money and incentives for biogas projects not only because of the potential Missouri holds, Smith says, but also to allow diversification of the state's portfolio as it strives to meet its 15 percent by 2021 renewable energy standard. "Missouri is pretty blessed to have the ability to play in all areas of the renewable energy sector," Chung says. AD projects would be eligible for Missouri's renewable energy standards program and could create a shift away from the trend of Missouri utilities purchasing wind power from out of state to meet their goals.

But there's one glaring problem: Missouri has incredibly low electricity rates, so power purchase agreements with investor-owned utilities will be hard to come by, Smith explains. The state has the eighth lowest commercial electrical rate in the nation.

Still, interest in AD-to-electricity projects is picking up and installation of the first may be the biggest hurdle to clear. "Over the past three years, we've received inquiries from people expressing interest in digester projects, but there's a lot of risk to be the first one," Xu says. Hampton Feedlot is a typical size for such a project and a great model that, he hopes, others will follow. "We hope we're a good example," Daniels says.

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